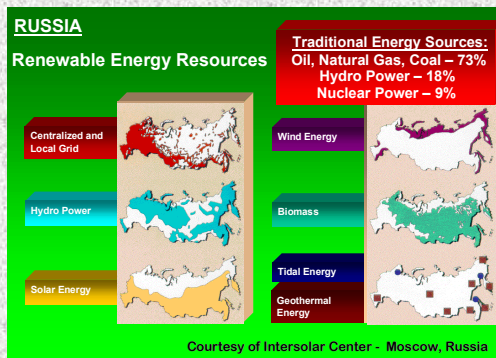
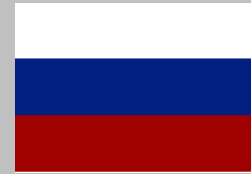


# Russian Federation

Vahan Gevorgian, NREL



## NREL's Participation in the U.S./Russia Cooperative Program for Renewable Energy

- Assisted in design, installation, and operation of 21 wind/diesel hybrid systems in Russia's Northern Territories (40 BWC wind turbines with related equipment were shipped to Russia in 1996 using USAID funds).
- Completed feasibility study and installation of a 1-MW biomass power plant in Arkhangelsk region.
- Assisted in the start-up operation of a 2-MW/year triple-junction, amorphous-silicon manufacturing facility in Moscow using U.S. technology.
- Exploring possibility of financing large-scale wind/diesel hybrid and biomass power systems for Russia's Northern Territories (900 sites).
- Developing a strategic plan for electrification of Russian Northern Territories.
- Completed feasibility studies for large utility-scale wind farms in southern Russia (Krasnodar/Novorossisk) and Russian Far East (Nakhodka).



Wind/diesel hybrid system at Krasnoe Village, Arkhangelsk Region

## Development of 1-MW Biomass Power Plant in Arkhangelsk Region

- NREL completed a detailed feasibility study for a 1-MW power plant in Verkhne-Ozerski in 1998. The study showed the economic viability of the power plant, which will use 13,000 tons of wood waste, available near the village. The power plant design has been expanded to include three more villages in the region.
- The study was funded by the U.S. Trade and Development Agency and was completed in September 2000. The MFE has been authorized by the World Bank to allocate up to US\$3 million towards the construction of the power plant.
- This project will serve as a basis for USAID/Winrock FOREST projects for development of biomass power systems in Russia's Far East.

## U.S. DOE/Russian Ministry of Fuel and Energy: Joint Collaboration for Renewable Energy Resources in Russia

- September 1993—Agreement by Joint Committee of Economical and Technical Cooperation between Prime Minister Chernomyrdin and Vice President Gore to examine options for Russia's energy future (including EERE).
- October 1993—Memorandum of Cooperation signed by Russian Minister of F&E (MFE) Yuri Shafraannik and DOE Secretary Hazel O'Leary.
- October 1994—Establishment of EERE Joint Coordinating Committee by Russian Deputy Minister Vitaly Bushuev and DOE Assistant Secretary Christine Ervin.
- November 1994—Meeting between NREL and Russian MFE representatives to establish renewable energy working group and prepare program implementation plan.



Locations of Wind/Diesel Pilot Projects

## Wind/Diesel Hybrid Systems for Russia's Northern Territories

- Two systems in Arkhangelsk region are fully operational.
- Installed one system in Murmansk region (5xExcel Wind turbines) and it is operational.
- Installed fourteen hybrid systems in Chukotka.
- Established wind/diesel test facility with NREL assistance in Istra, near Moscow.
- Installing demo system (6xBergey Excel wind turbines) in Rigovka, near Moscow.



Site for a 1-MW biomass power plant in Verkhne-Ozerski village, Arkhangelsk Region, that will burn nearby wood waste.